

CLAIMS

Therefore, having thus described the invention, at least the following is claimed:

- 1 1. A waveguide comprising:
2 a waveguide core, and
3 an air-gap cladding engaging a portion of the waveguide core.
- 1 2. The waveguide of claim 1, wherein the waveguide core includes at least one
2 coupling element.
- 1 3. The waveguide of claim 1, further comprising:
2 at least one coupling element disposed adjacent to the waveguide core.
- 1 4. The waveguide of claim 1, further comprising:
2 a second waveguide cladding adjacent to the waveguide core.
- 1 5. The waveguide of claim 1, further comprising:
2 a second waveguide core.

1 6. A device, comprising:

2 a waveguide having a waveguide core and an air-gap cladding
3 engaging a portion of waveguide core.

1 7. The device of claim 6, wherein the waveguide is included in a microelectronic
2 device.

1 8. The device of claim 6, wherein the waveguide is included in an integrated
2 optical device.

1 9. The device of claim 6, wherein the waveguide is included in a photonic crystal
2 device.

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- 1 10. A method for fabricating a waveguide comprising:
2 (a) providing a substrate having a lower cladding layer disposed on the
3 substrate;
4 (b) disposing a waveguide core on a portion of the lower cladding
5 layer;
6 (c) disposing a sacrificial layer onto at least one portion of the lower
7 cladding layer and the waveguide core;
8 (d) disposing an overcoat layer onto the lower cladding layer and the
9 sacrificial layer; and
10 (e) removing the sacrificial layer to define an air-gap cladding layer
11 within the overcoat polymer layer and engaging a portion of the waveguide
12 core.
- 1 11. The method of claim 10, further including:
2 disposing an optical grating layer adjacent to the waveguide core after
3 (b) and before (c).

- 1 12. A method for fabricating a device comprising:
- 2 (a) providing a substrate;
- 3 (b) disposing a waveguide core on a portion of the substrate;
- 4 (c) disposing a sacrificial layer onto at least one portion of the substrate
- 5 and the waveguide core;
- 6 (d) disposing an overcoat layer onto the substrate and the sacrificial
- 7 layer; and
- 8 (e) removing the sacrificial layer to define an air-gap cladding layer
- 9 within the overcoat polymer layer and engaging a portion of the waveguide
- 10 core.

- 1 13. A system for fabricating a waveguide comprising:
- 2 (a) means for providing a substrate having a lower cladding layer
- 3 disposed on the substrate;
- 4 (b) means for disposing a waveguide core on a portion of the lower
- 5 cladding layer;
- 6 (c) means for disposing a sacrificial layer onto at least one portion of
- 7 the lower cladding layer and the waveguide core;
- 8 (d) means for disposing an overcoat layer onto the lower cladding layer
- 9 and the sacrificial layer; and
- 10 (e) means for removing the sacrificial layer to define an air-gap
- 11 cladding layer within the overcoat polymer layer and engaging a portion of the
- 12 waveguide core.